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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/880,616 06/23/97 COHEN

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TM02/1003

EXAMINER

FOURSON, G

ART UNIT

PAPER NUMBER

2151

DATE MAILED:

10/03/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

# Office Action Summary

Application No.  
08/880,616

Applicant(s)  
Cohen et al.

Examiner  
Gary Fourson

Art Unit  
2151



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 16-20 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 16-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some\* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_ 20) ☐ Other:

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### **DETAILED ACTION**

1. The request filed on 22 August 2001 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 08/880,616 is acceptable and a CPA has been established. An action on the CPA follows.

#### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1, 11, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boland et al. (5,872,972) in view of Admitted Prior Art (Applicant's Specification page 2 line 20 through page 3 line 7).**

With respect to claims 1 and 11, Boland et al. teaches a plurality of tasks (processes) of more than one application (col 4 line 19, "all runnable processes in global run queue 24, ..."), computing nodes (col 3 line 52), a plurality of local processes (col 4 line 21, "processes which have been previously run and are now affinitized to a specific processor." Col 4 line 59, "once a processor runs a process, it would never age away its affinity from that processor."), providing application information to global scheduler means (The scheduler 90 obviously takes information from applications or processes to schedule the processes into the global priority queue. In column 3 lines 1-5 processes provide affinity information to the scheduler.), and dynamically creating a schedule of a plurality of tasks utilizing priorities (col 4 lines 22-24), and a local scheduler comprising means for receiving said global prioritized schedule (Column 4 lines 26-31 teach that each 'processor' consults the global queue.) as well as means to update a local priority

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list to include said assigned processes (Referring to Figure 7, column 7 lines 26-28, “These processes may thereafter be reordered based upon process priority within a nodal priority run queues 71 and 77 ...”). Although, Boland does not explicitly refer to the runnable processes in column 4 lines 16-25 as being from a plurality of applications, the scheduling of multiple processes as described by Boland would indicate to one of ordinary skill in the art that the multiple processes arise from a multiplicity of applications. One would not be inclined to conclude that the multiplicity of processes are merely due to multiple instances of the same application/program.

As to means for prioritizing the processes according to the prioritized schedule (Applicant has divulged on pages 2-3 that the AIX™ operating system assigns a common priority to the process(es) required for (or correlated to) a task. As to the claimed limitation of means for ascertaining which process(es) are assigned to the tasks, Unix threads/tasks are inherently correlated to the process execution space provided by the scheduling and/or operating system. Applicant admits that the process is correlated to a task in the prior art AIX™ operating system. Having the processes, associated with individual tasks, assigned priorities corresponding to the priorities of the schedule would have been a highly desirable feature in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the local scheduling/correlating means of IBM into the task scheduling system of Cameron et al., because prioritizing local processes according to the task correlation would have been expected to result in higher cache preloading efficiency.).

As to **claims 12 and 14**, invoking operating system priorities to schedule tasks in accordance with said prioritized schedule: The operating system would inherently follow any prioritizing scheme employed by the programmer or else there would not be any need to incorporate the local/global scheduling means in the first place.

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**4. Claims 2, 4-10, 13-16, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boland et al. (5,872,972) in view of Admitted Prior Art (Applicant's Specification page 2 line 20 through page 3 line 7), and further in view of Cameron et al. (5,325,526).**

As to **claim 2**, said computing node comprising an operating system for "receiving input" from the prioritizing means and "directing said assigned processes" to execute tasks in a prioritized order: Cameron et al. in Figures 4 and 5 show a prior art task scheduler. Column 5 last paragraph elaborates stating that each scheduler comprises operating system software responsible for controlling the execution of a plurality of tasks. It would have been obvious to one ordinarily skilled in the art at the time the invention was made for the OS to receive information about the execution of the plurality of tasks as taught by Cameron et al. with the task scheduling system of Boland et al., because Cameron et al. states in column 6 lines 28-31, "Interactive scheduling using Unix, or other operating systems in a single processor environment, is well known to those of ordinary skill in the art."

As to **claim 4**, application coordinator means for communicating information to said scheduler: Scheduling information must inherently be obtained by some means in order to produce a prioritized list of tasks, however in column 8, Cameron et al. teaches on line 2, "The allocator and scheduler 710 comprises processing logic and data for allocating nodes to specific application programs and for scheduling applications programs for execution." The "Make Partition" procedure (720) is the request for the allocator/scheduler to initialize tasks which as stated on line 18, "are retrieved and loaded into the nodes associated with the specified partition."

As to **claim 5**, said local processes being adapted to perform tasks in parallel: Also, in column 2 on line 50 Cameron teaches that application programs are allowed to

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execute on one or more nodes of a partition. Furthermore, column 7 line 40 states, "...an entire application program is active at once across all of the nodes on which the application program is loaded." The multi-node or multi-processor collaborative effort to the processing of a set of tasks or application program processes is the truest definition of parallel processing. Cameron et al. in column 1 on lines 26 to 30 indicates that multi-tasking, round robin processing, time slicing, or parallel processing was well known to one of ordinary skill in the art at the time the invention was made.

As to **claim 6**, said scheduler means comprising global scheduler means which in turn comprises means for dynamically scheduling then communicating the schedule to the local scheduler: Cameron et al. teaches the local nodes are assigned to application programs. The allocator and scheduler 612 act functionally as a "global scheduler" by controlling and assigning the appropriate nodes from a particular layer. Column 7 line 50 states, "As will be described below, allocator and scheduler 612 may and typically does operate with a plurality of partitions 614." In column 9 on line 50, "In the preferred embodiment, partition data blocks and application data blocks can be maintained in the same doubly-linked list." Further down on line 64 it is stated that, "The current priority field 918 may dynamically change as the priorities of associated application programs or sub-partitions change priority." Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize means for dynamically scheduling then communicating the schedule to a local scheduler as taught by Cameron et al. with the task scheduling means of Boland, because Cameron et al. recognized, "The current priority field 918 may dynamically change as the priorities of associated application programs or sub-partitions change priority." [line 64]

As to **claim 7**, said local scheduler being adapted to communicate process information to the global scheduler: Cameron et al. teaches in column 14 lines 12-31

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three access modes to the partition data. They are read, write, and execute access modes allowing or disallowing the ability to run application programs from a partition and to create or remove sub-partitions from a partition. This information is also available to the allocator/scheduler 710. Also, figure 7 shows application data 736 specifically available to the allocator/scheduler.

As to **claim 8**, the global scheduler also comprising timer means to effect schedule communication: Cameron et al. teaches in column 11 lines 6-11 a time executed field 1021.

As to **claim 9**, said global scheduler including a local scheduler address table: Cameron et al. teaches in column 13 lines 15-33, "Two hash tables providing a quick look-up mechanism for locating partitions ..."

As to **claim 10**, Boland et al. as modified by Admitted Prior Art (Applicant's Specification page 2 line 20 through page 3 line 7), and as further modified by Cameron et al. for the rejection of claims 1, 2, and 6 teaches the limitations as claimed.

As to **claim 19**, the communicating and updating steps noted above as taught by Boland do not require user input, and, therefore, are automatically performed.

As to **claim 13**, scheduler means is remote to the node and communicating the schedule to the node: Cameron et al. shows in Figures 4 and 5 that in prior art methods of task management systems, the Scheduler 410, 510 can be remotely located from the processors. In column 6 lines 32-45 refer specifically to Figure 5 noting that the scheduler arranges an orderly schedule for multiple tasks executing on multiple processors. Line 37 mentions a common memory where the schedule information would be communicated to the three processing nodes. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have scheduler means of Boland et al. as modified remote to the node as taught by Cameron et al.,

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because Cameron et al. recognized multiprocessor systems require global scheduling means remote from the majority of computing nodes.

As to **claim 15**, communicating task execution information to the scheduler: Cameron et al. teaches in column 11 lines 6-11 a time executed field 1021. This “execution information” is part of a process group field 1020 which is updated and available to the scheduler.

As to **claim 16**, repeating said steps until all tasks have been completed: Cameron teaches recursive scheduling in column 15 on lines 12-14.

As to **claim 18**, said remotely located scheduler dynamically maintaining a computing node’s list: Figure 7, Layer Data -738-; Column 9 lines 28-31, “The layer data structure 738 comprises information including identity of the nodes of the partition that are allocated by a list of consumers to which the layer points.”

As to **claim 20**, Boland teaches receiving task information from an application coordinator [scheduler 90] and maintaining an activity scheduler list [The nodal run queues comprise processes previously run on a particular processor for which the data and instruction caches may have an affinity. See col. 4 lines 37-39] and an activity priority list [priority queues].

**5. Claims 3 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boland et al. (5,872,972) as modified by Admitted Prior Art (Applicant’s Specification page 2 line 20 through page 3 line 7) and Cameron et al. (5,325,526) for claims 2 and 14 above, and further in view of Ripps (The Multitasking Mindset Meets the Operating System).**

As to **claim 3**, the operating system being further adapted to interleave local operations with said tasks: A node or CPU controlled by an operating system would inherently process local operations (e.g. an exception) pertaining to the operating system

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commands. Ripps teaches on page 9 that C and proprietary OS functions are intermixed in a typical task. Context switches controlled by the operating system are also well known local tasks which are interleaved between the application task execution.

As to **claim 17**, Boland et al. as modified by Admitted Prior Art (Applicant's Specification page 2 line 20 through page 3 line 7), Cameron et al., and as further modified by Ripps for the rejection of claims 1, 3, 5, 11, 12, and 14 teaches the limitations substantially as claimed.

***Pertinent Prior Art***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Alfieri et al. (US 5,745,778), Valencia (US 5,185,861), and Iwasaki et al. (5,659,777) teach coordinated multiprocessor scheduling.

***Conclusion***

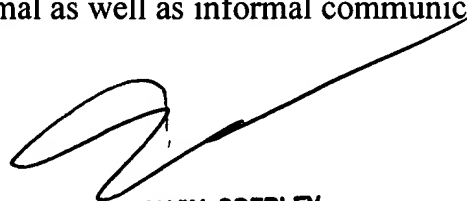
Any inquiry concerning this communication should be directed to **Gary Fourson** at telephone number **(703) 305-4392** or E-mail at the address **gary.fourson@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-9600.

The fax number **(703) 305-9731** for formal as well as informal communications may be utilized for expedited transactions.

gsf

September 27, 2001



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